Sequence Listings for CHM003.ST25
SEQUENCE LISTING

<110> Whitsett, Jeffrey A

<120> USE OF FGF-18 PROTEIN, TARGET PROTEINS AND THEIR RESPECTIVE
       ENCODING NUCLEOTIDE SEQUENCES TO INDUCE CARTILAGE FORMATION

<130> CHM-003

<140> 10/551,105
<141> 2004-03-26

<150> US 60/458,224
<151> 2003-03-27

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<170> PatentIn version 3.3

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<212> DNA
<213> House Mouse

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                20   25   30

Ile His Val Glu Asn Gln Thr Arg Ala Arg Asp Asp Val Ser Arg Leu
            35   40   45

Gln Leu Arg Leu Tyr Gln Leu Tyr Ser Arg Thr Ser Gly Lys
        50   55   60

SEQUENCE LISTING

<110> Whitsett, Jeffrey A

<120> USE OF FGF-18 PROTEIN, TARGET PROTEINS AND THEIR RESPECTIVE
ENCODING NUCLEOTIDE SEQUENCES TO INDUCE CARTILAGE FORMATION

<130> CHM-003

<140> 10/551,105
<141> 2004-03-26

<150> US 60/458,224
<151> 2003-03-27

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<400> 2

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Phe Arg Ile His Val Glu Asn Gln Thr Arg Ala Arg Asp Asp Val Ser
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Arg Lys Gln Leu Arg Leu Tyr Gln Leu Tyr Ser Arg Thr Ser Gly Lys
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```

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His Ile Gln Val Leu Gly Arg Arg Ile Ser Ala Arg Gly Glu Asp Gly
65              70              75              80
```

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Asp Lys Tyr Ala Gln Leu Leu Val Glu Thr Asp Thr Phe Gly Ser Gln
                85              90              95
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Val Arg Ile Lys Gly Lys Glu Thr Glu Phe Tyr Leu Cys Met Asn Arg
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Lys Gly Lys Leu Val Gly Lys Pro Asp Gly Thr Ser Lys Glu Cys Val
        115             120             125
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Phe Ile Glu Lys Val Leu Glu Asn Asn Tyr Thr Ala Leu Met Ser Ala
    130             135             140
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Lys Tyr Ser Gly Trp Tyr Val Gly Phe Thr Lys Lys Gly Arg Pro Arg
145             150             155             160
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Lys Gly Pro Lys Thr Arg Glu Asn Gln Gln Asp Val His Phe Met Lys
                165             170             175
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Arg Tyr Pro Lys Gly Gln Ala Glu Leu Gln Lys Pro Phe Lys Tyr Thr
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<400> 4

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                20                  25                  30

Asp Phe Arg Ile His Val Glu Asn Gln Thr Arg Ala Arg Asp Asp Val
            35                  40                  45

Ser Arg Lys Gln Leu Arg Leu Tyr Gln Leu Tyr Ser Arg Thr Ser Gly
        50                  55                  60

Lys His Ile Gln Val Leu Gly Arg Arg Ile Ser Ala Arg Gly Glu Asp
65                  70                  75                  80
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Gly Asp Lys Tyr Ala Gln Leu Leu Val Glu Thr Asp Thr Phe Gly Ser
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Gln Val Arg Ile Lys Gly Lys Glu Thr Glu Phe Tyr Leu Cys Met Asn
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Arg Lys Gly Lys Leu Val Gly Lys Pro Asp Gly Thr Ser Lys Glu Cys
       115   120   125

Val Phe Ile Glu Lys Val Leu Glu Asn Asn Tyr Thr Ala Leu Met Ser
   130   135   140

Ala Lys Tyr Ser Gly Trp Tyr Val Gly Phe Thr Lys Lys Gly Arg Pro
145   150   155   160

Arg Lys Gly Pro Lys Thr Arg Glu Asn Gln Gln Asp Val His Phe Met
       165   170   175

Lys Arg Tyr Pro Lys Gly Gln Pro Glu Leu Gln Lys Pro Phe Lys Tyr
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Thr Thr Val Thr Lys Arg Ser Arg Arg Ile Arg Pro Thr His Pro Ala
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<213> House Mouse

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<400> 6

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            20   25   30

Lys Arg Arg His Pro Lys Lys Leu Thr Pro Leu Ala Tyr Leu Gln Phe
        35   40   45

Ile Pro Asn Val Ala Glu Lys Thr Leu Gly Ala Ser Gly Arg Tyr Glu
    50   55   60

Gly Lys Ile Thr Arg Asn Ser Glu Arg Phe Lys Glu Leu Thr Pro Asn
65   70   75   80

Tyr Asn Pro Asp Ile Ile Phe Lys Asp Glu Glu Asn Thr Gly Ala Asp
            85   90   95

Arg Leu Met Thr Gln Arg Cys Lys Asp Lys Leu Asn Ala Leu Ala Ile
            100   105   110

Ser Val Met Asn Gln Trp Pro Gly Val Lys Leu Arg Val Thr Glu Gly
        115   120   125

Trp Asp Glu Asp Gly His His Ser Glu Glu Ser Leu His Tyr Glu Gly
    130   135   140

Arg Ala Val Asp Ile Thr Thr Ser Asp Arg Asp Arg Ser Lys Tyr Gly
145   150   155   160

Met Leu Ala Arg Leu Ala Val Glu Ala Gly Phe Asp Trp Val Tyr Tyr
            165   170   175

Gly Ser Lys Ala His Ile His Cys Ser Val Lys Ala Glu Asn Ser Val
            180   185   190

Ala Ala Lys Ser Gly Gly Cys Phe Pro Gly Ser Ala Thr Val His Leu
            195   200   205

Glu Gln Gly Gly Thr Lys Leu Val Lys Asp Leu Arg Pro Gly Asp Arg
210   215   220

Val Leu Ala Ala Asp Asp Gln Gly Arg Leu Leu Tyr Ser Asp Phe Leu
225   230   235   240

Thr Phe Leu Asp Arg Asp Glu Gly Ala Lys Lys Val Phe Tyr Val Ile
          245   250   255

Gly Thr Leu Glu Pro Arg Glu Pro Leu Leu Leu Thr Ala Ala His Leu
        260   265   270

Leu Phe Val Ala Pro His Asn Asp Ser Gly Pro Thr Pro Gly Pro Ser
     275   280   285

Ala Leu Phe Ala Ser Arg Val Arg Pro Gly Gln Arg Val Tyr Val Val
   290   295   300

Ala Glu Arg Gly Gly Asp Arg Arg Leu Leu Pro Ala Ala Val His Ser
305   310   315   320

Val Thr Leu Arg Glu Glu Glu Ala Gly Ala Tyr Ala Pro Leu Thr Ala
        325   330   335

His Gly Thr Ile Leu Ile Asn Arg Val Leu Ala Ser Cys Tyr Ala Val
        340   345   350

Ile Glu Glu His Ser Trp Ala His Arg Ala Phe Ala Pro Phe Arg Leu
     355   360   365

Ala His Ala Leu Leu Ala Ala Leu Ala Pro Ala Arg Thr Asp Gly Gly
   370   375   380

Gly Gly Gly Ser Ile Pro Ala Ala Gln Ser Ala Thr Glu Ala Arg Gly
385   390   395   400

Ala Glu Pro Thr Ala Gly Ile His Trp Tyr Ser Gln Leu Leu Tyr His
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<212> DNA
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<212> PRT
<213> House Mouse

<400> 8

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Ser Gly Ile His Ser Gly Ala Thr Thr Thr Ala Pro Ser Leu Ser Gly
        35   40   45

Lys Gly Asn Pro Glu Glu Glu Asp Val Asp Thr Ser Gln Val Leu Tyr
        50   55   60

Glu Trp Glu Gln Gly Phe Ser Gln Ser Phe Thr Gln Gln Gln Val Ala
65   70   75   80

Asp Ile Asp Gly Gln Tyr Ala Met Thr Arg Ala Gln Arg Val Arg Ala
                85   90   95

Ala Met Phe Pro Glu Thr Leu Asp Glu Gly Met Gln Ile Pro Ser Thr
            100   105   110

Gln Phe Asp Ala Ala His Pro Thr Asn Val Gln Arg Leu Ala Glu Pro
        115   120   125

Ser Gln Met Leu Lys His Ala Val Val Asp Leu Ile Asp Tyr Gln Asp
    130   135   140

Asp Ala Glu Leu Ala Thr Arg Ala Ile Pro Glu Leu Thr Lys Leu Leu
145   150   155   160

Asn Asp Glu Asp Gln Val Val Val Asn Lys Ala Ala Val Met Val His
                165   170   175

Gln Leu Ser Lys Lys Glu Ala Ser Arg His Ala Ile Met Arg Ser Pro
            180   185   190

Gln Met Val Ser Ala Ile Val Arg Thr Met Gln Asn Thr Asn Asp Val
            195   200   205

Glu Thr Ala Arg Cys Thr Ala Gly Thr Leu His Asn Leu Ser His His
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Arg Glu Gly Leu Leu Ala Ile Phe Lys Ser Gly Gly Ile Pro Ala Leu

225   230   235   240

Val Lys Met Leu Gly Ser Pro Val Asp Ser Val Leu Phe Tyr Ala Ile
            245   250   255

Thr Thr Leu His Asn Leu Leu Leu His Gln Glu Gly Ala Lys Met Ala
            260   265   270

Val Arg Leu Ala Gly Gly Leu Gln Lys Met Val Ala Leu Leu Asn Lys
            275   280   285

Thr Asn Val Lys Phe Leu Ala Ile Thr Thr Asp Cys Leu Gln Ile Leu
            290   295   300

Ala Tyr Gly Asn Gln Glu Ser Lys Leu Ile Ile Leu Ala Ser Gly Gly
305   310   315   320

Pro Gln Ala Leu Val Asn Ile Met Arg Thr Tyr Thr Tyr Glu Lys Leu
            325   330   335

Leu Trp Thr Thr Ser Arg Val Leu Lys Val Leu Ser Val Cys Ser Ser
            340   345   350

Lys Asn Pro Ala Ile Val Glu Ala Gly Gly Met Gln Ala Leu Gly Leu
            355   360   365

His Leu Thr Asp Pro Ser Gln Arg Ser Val Gln Asn Cys Leu Trp Thr
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Leu Arg Asn Ser Leu Asp Ala Ala Thr Lys Gln Glu Gly Met Glu Gly
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Leu Leu Gly Thr Leu Val Gln Leu Leu Gly Ser Asp Asp Ile Asn Val
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Val Thr Cys Ala Ala Gly Ile Leu Ser Asn Leu Thr Cys Asn Asn Tyr
            420   425   430

Lys Asn Lys Met Met Val Cys Gln Val Gly Gly Ile Glu Ala Leu Val
            435   440   445

Arg Thr Val Leu Arg Ala Gly Asp Arg Glu Asp Glu Thr Glu Pro Ala
            450   455   460

Ile Cys Ala Leu Arg His Leu Thr Ser Arg His Gln Glu Ala Glu Met
465   470   475   480

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Ala Gln Asn Ala Val Arg Leu His Tyr Gly Leu Pro Val Val Val Lys
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Leu Leu His Pro Pro Ser His Trp Pro Leu Ile Lys Ala Thr Val Gly
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Leu Ile Arg Asn Leu Ala Leu Cys Pro Ala Asn His Ala Pro Leu Arg
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Glu Gln Gly Ala Ile Pro Arg Leu Val Gln Leu Leu Val Arg Ala His
        530   535   540

Gln Asp Thr Gln Arg Arg Thr Ser Met Gly Gly Thr Gln Gln Gln Phe
545   550   555   560

Val Glu Gly Val Arg Met Glu Glu Ile Val Glu Gly Cys Thr Gly Ala
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Leu His Ile Leu Ala Arg Asp Val His Asn Arg Ile Val Ile Arg Gly
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Leu Asn Thr Ile Pro Leu Phe Val Gln Leu Leu Tyr Ser Pro Ile Glu
            595   600   605

Asn Ile Gln Arg Val Ala Ala Gly Val Leu Cys Glu Leu Ala Gln Asp
    610   615   620

Lys Glu Ala Ala Glu Ala Ile Glu Ala Glu Gly Ala Thr Ala Pro Leu
625   630   635   640

Thr Glu Leu Leu His Ser Arg Asn Glu Gly Val Ala Thr Tyr Ala Ala
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Ala Val Leu Phe Arg Met Ser Glu Asp Lys Pro Gln Asp Tyr Lys Lys
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Arg Leu Ser Val Glu Leu Thr Ser Ser Leu Phe Arg Thr Glu Pro Met
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Ala Trp Asn Glu Thr Ala Asp Leu Gly Leu Asp Ile Gly Ala Gln Gly
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Glu Ala Leu Gly Tyr Arg Gln Asp Asp Pro Ser Tyr Arg Ser Phe His
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Ser Gly Gly Tyr Gly Gln Asp Ala Leu Gly Met Asp Pro Met Met Glu
            725   730   735

His Glu Met Gly Gly His His Pro Gly Ala Asp Tyr Pro Val Asp Gly
        740   745   750

Leu Pro Asp Leu Gly His Ala Gln Asp Leu Met Asp Gly Leu Pro Pro
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Gly Asp Ser Asn Gln Leu Ala Trp Phe Asp Thr Asp Leu
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Arg Trp Trp Gly Ile Val Asn Ile Ala Ser Ser Thr Asn Leu Leu Thr
        35                  40                  45


Asp Ser Lys Ser Leu Gln Leu Val Leu Glu Pro Ser Leu Gln Leu Leu
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Ser Arg Lys Gln Arg Arg Leu Ile Arg Gln Asn Pro Gly Ile Leu His
65                  70                  75                  80


Ser Val Ser Gly Gly Leu Gln Ser Ala Val Arg Glu Cys Lys Trp Gln
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Phe Arg Asn Arg Arg Trp Asn Cys Pro Thr Ala Pro Gly Pro His Leu
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Phe Gly Lys Ile Val Asn Arg Gly Cys Arg Glu Thr Ala Phe Ile Phe
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Ala Ile Thr Ser Ala Gly Val Thr His Ser Val Ala Arg Ser Cys Ser
    130                 135                 140

Ala Gly Ser Ile Glu Ser Cys Thr Cys Asp Tyr Arg Arg Arg Gly Pro
145                 150                 155                 160

Gly Gly Pro Asp Trp His Trp Gly Gly Cys Ser Asp Asn Ile Asp Phe
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Gly Arg Leu Phe Gly Arg Glu Phe Val Asp Ser Gly Glu Lys Gly Arg
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Asp Leu Arg Phe Leu Met Asn Leu His Asn Asn Glu Ala Gly Arg Thr
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Thr Val Phe Ser Glu Met Arg Gln Glu Cys Lys Cys His Gly Met Ser
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Gly Ser Cys Thr Val Arg Thr Cys Trp Met Arg Leu Pro Thr Leu Arg
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Ala Val Gly Asp Val Leu Arg Asp Arg Phe Asp Gly Ala Ser Arg Val
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Leu Tyr Gly Asn Arg Gly Ser Asn Arg Ala Ser Arg Ala Glu Leu Leu
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Arg Leu Glu Pro Glu Asp Pro Ala His Lys Pro Pro Ser Pro His Asp
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Leu Val Tyr Phe Glu Lys Ser Pro Asn Phe Cys Thr Tyr Ser Gly Arg
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Leu Gly Thr Ala Gly Thr Ala Gly Arg Ala Cys Asn Ser Ser Ser Pro
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Ala Leu Asp Gly Cys Glu Leu Leu Cys Cys Gly Arg Gly His Arg Thr
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Arg Thr Gln Arg Val Thr Glu Arg Cys Asn Cys Thr Phe His Trp Cys
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Cys His Val Ser Cys Arg Asn Cys Thr His Thr Arg Val Leu His Glu
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Val Met Asp Pro Thr Ser Ile Cys Arg Lys Ala Arg Arg Leu Ala Gly
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Arg Gln Ala Glu Leu Cys Gln Ala Glu Pro Glu Val Val Ala Glu Leu
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Ala Arg Gly Ala Arg Leu Gly Val Arg Glu Cys Gln Phe Gln Phe Arg
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Phe Arg Arg Trp Asn Cys Ser Ser His Ser Lys Ala Phe Gly Arg Val
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Leu Gln Gln Asp Ile Arg Glu Thr Ala Phe Val Phe Ala Ile Thr Ala
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Ala Gly Ala Ser His Ala Val Thr Gln Ala Cys Ser Met Gly Glu Leu
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Leu Gln Cys Gly Cys Gln Ala Pro Arg Gly Arg Ala Pro Pro Arg Pro
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Ser Gly Leu Leu Gly Thr Pro Gly Pro Pro Gly Pro Thr Gly Ser Pro
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Asp Ala Ser Ala Ala Trp Glu Trp Gly Gly Cys Gly Asp Asp Val Asp
                165   170   175

Phe Gly Asp Glu Lys Ser Arg Leu Phe Met Asp Ala Gln His Lys Arg
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Gly Arg Gly Asp Ile Arg Ala Leu Val Gln Leu His Asn Asn Glu Ala
            195   200   205

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Gly Arg Leu Ala Val Arg Ser His Thr Arg Thr Glu Cys Lys Cys His
    210   215   220

Gly Leu Ser Gly Ser Cys Ala Leu Arg Thr Cys Trp Gln Lys Leu Pro
225   230   235   240

Pro Phe Arg Glu Val Gly Ala Arg Leu Leu Glu Arg Phe His Gly Ala
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Ser Arg Val Met Gly Thr Asn Asp Gly Lys Ala Leu Leu Pro Ala Val
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Arg Thr Leu Lys Pro Pro Gly Arg Ala Asp Leu Leu Tyr Ala Ala Asp
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Ser Pro Asp Phe Cys Ala Pro Asn Arg Arg Thr Gly Ser Pro Gly Thr
    290   295   300

Arg Gly Arg Ala Cys Asn Ser Ser Ala Pro Asp Leu Ser Gly Cys Asp
305   310   315   320

Leu Leu Cys Cys Gly Arg Gly His Arg Gln Glu Ser Val Gln Leu Glu
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<211> 349
<212> PRT
<213> House Mouse

<400> 14

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Met His Arg Asn Phe Arg Lys Trp Ile Phe Tyr Val Phe Leu Cys Phe
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Gly Val Leu Tyr Val Lys Leu Gly Ala Leu Ser Ser Val Val Ala Leu
                20                  25                  30


Val Ala Asn Ile Ile Cys Asn Lys Ile Pro Gly Leu Ala Pro Arg Gln
            35                  40                  45


Arg Ala Ile Cys Gln Ser Arg Pro Asp Ala Ile Ile Val Ile Gly Glu
        50                  55                  60


Gly Ala Gln Met Gly Ile Asp Glu Cys Gln His Gln Phe Arg Phe Gly
65                  70                  75                  80


Arg Trp Asn Cys Ser Ala Leu Gly Glu Lys Thr Val Phe Gly Gln Glu
                85                  90                  95


Leu Arg Val Gly Ser Arg Glu Ala Ala Phe Thr Tyr Ala Ile Thr Ala
                100                 105                 110
```

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Ala Gly Val Ala His Ala Val Thr Ala Ala Cys Ser Gln Gly Asn Leu
    115   120   125

Ser Asn Cys Gly Cys Asp Arg Glu Lys Gln Gly Tyr Tyr Asn Gln Ala
    130   135   140

Glu Gly Trp Lys Trp Gly Gly Cys Ser Ala Asp Val Arg Tyr Gly Ile
145   150   155   160

Asp Phe Ser Arg Arg Phe Val Asp Ala Arg Glu Ile Lys Lys Asn Ala
        165   170   175

Arg Arg Leu Met Asn Leu His Asn Asn Glu Ala Gly Arg Lys Val Leu
        180   185   190

Glu Asp Arg Met Lys Leu Glu Cys Lys Cys His Gly Val Ser Gly Ser
     195   200   205

Cys Thr Thr Lys Thr Cys Trp Thr Thr Leu Pro Lys Phe Arg Glu Val
    210   215   220

Gly His Leu Leu Lys Gly Lys Tyr Asn Ala Ala Val Gln Val Glu Val
225   230   235   240

Val Arg Ala Ser Arg Leu Arg Gln Pro Thr Phe Leu Arg Ile Lys Gln
        245   250   255

Leu Arg Ser Tyr Gln Lys Pro Met Glu Thr Asp Leu Val Tyr Ile Glu
        260   265   270

Lys Ser Pro Asn Tyr Cys Glu Glu Asp Ala Ala Thr Gly Ser Val Gly
        275   280   285

Thr Gln Gly Arg Leu Cys Asn Arg Thr Ser Pro Gly Ala Asp Gly Cys
    290   295   300

Asp Thr Met Cys Cys Gly Arg Gly Tyr Asn Thr His Gln Tyr Thr Lys
305   310   315   320

Val Trp Gln Cys Asn Cys Lys Phe His Trp Cys Cys Phe Val Lys Cys
        325   330   335

Asn Thr Cys Ser Glu Arg Thr Glu Val Phe Thr Cys Lys
        340   345